

AMENDMENTS TO THE CLAIMS

Listing of Claims:

1. (Withdrawn, currently amended) A process for the production of polyunsaturated fatty acids in an organism, which comprises the following steps: comprising
 - (a) introducing, into the organism, at least one nucleic acid sequence with the sequence shown in SEQ ID NO: 1, SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 9, SEQ ID NO: 11, SEQ ID NO: 13, SEQ ID NO: 14, SEQ ID NO: 16, SEQ ID NO: 18 or SEQ ID NO: 20, which codes for a polypeptide with lysophosphatidic acid acyltransferase activity; or
 - (b) introducing, into the organism, at least one nucleic acid sequence with the sequence shown in SEQ ID NO: 22, SEQ ID NO: 24 or SEQ ID NO: 26, which codes for a polypeptide with glycerol 3 phosphate acyltransferase activity; or
 - (c) introducing, into the organism, at least one nucleic acid sequence with the sequence shown in SEQ ID NO: 28, SEQ ID NO: 30 or SEQ ID NO: 32 which codes for a polypeptide with diacylglycerol acyltransferase activity; or
 - (d) introducing, into the organism, at least one nucleic acid sequence with the sequence shown in SEQ ID NO: 34 or SEQ ID NO: 36, which codes for a polypeptide with lecithin cholesterol acyltransferase activity; or
 - (e) introducing, into the organism, at least one nucleic acid with a nucleic acid sequence which can be derived from the coding sequence in SEQ ID NO: 1, SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 9, SEQ ID NO: 11, SEQ ID NO: 13, SEQ ID NO: 14, having at least 80% identity with the sequence of SEQ ID NO: 16, wherein the nucleic acid codes for a polypeptide with lysophosphatidic acid acyltransferase activity, SEQ ID NO: 18, SEQ ID NO: 20, SEQ ID NO: 22, SEQ ID NO: 24, SEQ ID NO: 26, SEQ ID NO: 28, SEQ ID NO: 30, SEQ ID NO: 32, SEQ ID NO: 34 or SEQ ID NO: 36 as the result of the degeneracy of the genetic code, or
- (~~(f)~~ (c)) introducing, into the organism, at least one derivative of the nucleic acid sequence shown in SEQ ID NO: 1, SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 6, SEQ ID

~~NO: 7, SEQ ID NO: 9, SEQ ID NO: 11, SEQ ID NO: 13, SEQ ID NO: 14, SEQ ID NO: 16, SEQ ID NO: 18, SEQ ID NO: 20, SEQ ID NO: 22, SEQ ID NO: 24, SEQ ID NO: 26, SEQ ID NO: 28, SEQ ID NO: 30, SEQ ID NO: 32, SEQ ID NO: 34 or SEQ ID NO: 36, which codes for a polypeptide[[s]] with the amino acid sequence shown in SEQ ID NO: 2, SEQ ID NO: 5, SEQ ID NO: 8, SEQ ID NO: 10, SEQ ID NO: 12, SEQ ID NO: 15, SEQ ID NO: 17, SEQ ID NO: 19, SEQ ID NO: 21, SEQ ID NO: 23, SEQ ID NO: 25, SEQ ID NO: 27, SEQ ID NO: 29, SEQ ID NO: 31, SEQ ID NO: 33, SEQ ID NO: 35 or SEQ ID NO: 37 and which have or having at least 40% homology at the amino acid level 80% identity with SEQ ID NO: 2, SEQ ID NO: 5, SEQ ID NO: 8, SEQ ID NO: 10, SEQ ID NO: 12, SEQ ID NO: 15, SEQ ID NO: 17, SEQ ID NO: 19, SEQ ID NO: 21, SEQ ID NO: 23, SEQ ID NO: 25, SEQ ID NO: 27, SEQ ID NO: 29, SEQ ID NO: 31, SEQ ID NO: 33, SEQ ID NO: 35 or SEQ ID NO: 37 and have an equivalent has lysophosphatidic acid acyltransferase activity, glycerol 3-phosphate acyltransferase activity, diacylglycerol acyltransferase activity or lecithin cholesterol acyltransferase activity, and~~

(g) (d) culturing and harvesting the organism.

2. (Withdrawn, currently amended) The process for the production of polyunsaturated fatty acids according to claim 1, wherein, additionally to the nucleic acid sequence[[s]] mentioned under (a) to (f) (c), further nucleic acid sequences which code for polypeptides of the fatty acid metabolism or lipid metabolism selected from the group consisting of acyl-CoA dehydrogenase(s), acyl-ACP[= acyl carrier protein] desaturase(s), acyl-ACP thioesterase(s), fatty acid acyltransferase(s), acyl-CoA:lysophospholipid acyltransferase(s), fatty acid synthase(s), fatty acid hydroxylase(s), acetyl-coenzyme A carboxylase(s), acyl-coenzyme A oxidase(s), fatty acid desaturase(s), fatty acid acetylenase(s), lipoxygenase(s), triacylglycerol lipase(s), allene oxide synthase(s), hydroperoxide lyase(s) or and fatty acid elongase(s) were introduced into the organism.

3. (Withdrawn, currently amended) The process for the production of polyunsaturated fatty acids according to claim 1, wherein, additionally to the nucleic acid sequences mentioned under (a) to (f) (c), further nucleic acid sequences which code for polypeptides selected from the group

consisting of acyl-CoA:lysophospholipid acyltransferase, Δ -4-desaturase, Δ -5-desaturase, Δ -6-desaturase, Δ -8-desaturase, Δ -9-desaturase, Δ -12-desaturase, Δ -5-elongase, Δ -6-elongase or and Δ -9-elongase, were introduced into the organism.

4. (Withdrawn) The process for the production of polyunsaturated fatty acids according to claim 1, wherein the polyunsaturated fatty acids produced are C₁₈-, C₂₀-, C₂₂- or C₂₄-fatty acids.

5. (Withdrawn) The process for the production of polyunsaturated fatty acids according to claim 1, wherein the polyunsaturated fatty acids are isolated from the organism in the form of an oil, a lipid or a free fatty acid.

6. (Withdrawn) The process for the production of polyunsaturated fatty acids according to claim 1, wherein the polyunsaturated fatty acids produced in the process are C₁₈-, C₂₀-, C₂₂- or C₂₄-fatty acids with at least two double bonds in the molecule.

7. (Withdrawn) The process for the production of polyunsaturated fatty acids according to claim 1, wherein a polyunsaturated fatty acid selected from the group consisting of dihomo- γ -linolenic acid, arachidonic acid, eicosapentaenoic acid, docosapentaenoic acid and docosahexaenoic acid is produced in the process.

8. (Withdrawn) The process for the production of polyunsaturated fatty acids according to claim 1, wherein the organism is a microorganism, a nonhuman animal or a plant.

9. (Withdrawn) The process for the production of polyunsaturated fatty acids according to claim 1, wherein the organism is a transgenic plant.

10. (Withdrawn) The process for the production of polyunsaturated fatty acids according to claim 1, wherein the transgenic plant is an oil crop plant.

11. (Currently amended) An isolated nucleic acid comprising a nucleic acid sequence selected from the group consisting of:

(a) [[a]] the nucleic acid sequence with the sequence shown in SEQ ID NO: 1, SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 9, SEQ ID NO: 11, SEQ ID NO: 13, SEQ ID NO: 14, SEQ ID NO: 16, SEQ ID NO: 18 or SEQ ID NO: 20,

- (b) nucleic acid sequences which, as the result of the degeneracy of the genetic code, can be derived from the coding sequence in SEQ ID NO: 1, SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 9, SEQ ID NO: 11, SEQ ID NO: 13, SEQ ID NO: 14, having at least 80% identity with the sequence of SEQ ID NO: 16 and coding for polypeptides having lysophosphatidic acid acyltransferase activity, SEQ ID NO: 18 or SEQ ID NO: 20;
- (c) derivatives of the nucleic acid sequences shown in SEQ ID NO: 1, SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 9, SEQ ID NO: 11, SEQ ID NO: 13, SEQ ID NO: 14, SEQ ID NO: 16, SEQ ID NO: 18 or SEQ ID NO: 20, which code for polypeptides with the amino acid sequence shown in SEQ ID NO: 2, SEQ ID NO: 5, SEQ ID NO: 8, SEQ ID NO: 10, SEQ ID NO: 12, SEQ ID NO: 15, SEQ ID NO: 17, SEQ ID NO: 19 or SEQ ID NO: 21 and which have or having at least 40% homology at the amino acid level 80% identity with the sequence of SEQ ID NO: 2, SEQ ID NO: 5, SEQ ID NO: 8, SEQ ID NO: 10, SEQ ID NO: 12, SEQ ID NO: 15, SEQ ID NO: 17, SEQ ID NO: 19 or SEQ ID NO: 21 and have lysophosphatidic acid acyltransferase activity.

12-14. (Cancelled)

15. (Currently amended) The isolated nucleic acid sequence according to of claim 11, wherein the nucleic acid sequence originates from a eukaryote.

16. (Withdrawn, currently amended) An amino acid sequence which is encoded by an the isolated nucleic acid sequence according to of claim 11.

17. (Currently amended) A gene construct comprising an the isolated nucleic acid according to of claim 11, where the nucleic acid is linked functionally to one or more regulatory signals.

18. (Currently amended) The gene construct according to of claim 17, wherein the nucleic acid construct comprises an additional biosynthesis gene[[s]] of the fatty acid metabolism or lipid metabolism selected from the group consisting of fatty acid metabolism or lipid metabolism selected from the group consisting of acyl-CoA dehydrogenase(s), acyl-ACP[= acyl carrier protein] desaturase(s), acyl-ACP thioesterase(s), fatty acid acyltransferase(s), acyl-CoA:lysophospholipid acyltransferase(s), fatty acid synthase(s), fatty acid hydroxylase(s),

acetyl-coenzyme A carboxylase(s), acyl-coenzyme A oxidase(s), fatty acid desaturase(s), fatty acid acetylenase(s), lipoxygenase(s), triacylglycerol lipase(s), allene oxide synthase(s), hydroperoxide lyase(s) ~~or and~~ fatty acid elongase(s).

19. (Currently amended) The gene construct ~~according to~~ of claim 17, wherein the nucleic acid construct comprises an additional biosynthesis gene[[s]] of the fatty acid metabolism or lipid metabolism selected from the group consisting of acyl-CoA:lysophospholipid acyltransferase, Δ-4-desaturase, Δ-5-desaturase, Δ-6-desaturase, Δ-8-desaturase, Δ-9-desaturase, Δ-12-desaturase, Δ-5-elongase, Δ-6-elongase ~~or and~~ Δ-9-elongase.

20. (Currently amended) A vector comprising [[a]] ~~the~~ nucleic acid ~~according to of claim 11~~ or a gene construct ~~according to claim 17 comprising said nucleic acid.~~

21. (Currently amended) A transgenic nonhuman organism comprising ~~at least one the~~ nucleic acid ~~according to of claim 11.~~

22. (Currently amended) The transgenic nonhuman organism ~~according to of claim 21,~~ wherein the organism is a microorganism, a nonhuman animal or a plant.

23. (Currently amended) The A transgenic nonhuman organism ~~according to of claim 21,~~ wherein the organism is a plant.

24. (Withdrawn) An oil, a lipid or a fatty acid or a fraction of these, produced by the process according to claim 1.

25. (Withdrawn, currently amended) An oil, a lipid or a fatty acid composition comprising polyunsaturated fatty acids prepared by [[a]] ~~the~~ process ~~according to of~~ claim 1 and originating from transgenic plants.

26. (Canceled)

27. (Currently amended) A transgenic nonhuman organism comprising ~~at least a the~~ gene construct ~~according to of~~ claim 17.

28. (Currently amended) A transgenic nonhuman organism comprising ~~at least a the~~ vector ~~according to of~~ claim 20.

29. (Withdrawn) A method of making feed, foodstuffs, cosmetics or pharmaceuticals comprising incorporating the polyunsaturated fatty acids prepared according to claim 1 in said feed, foodstuffs, cosmetics or pharmaceuticals.

30. (Withdrawn) A method of making feed, foodstuffs, cosmetics or pharmaceuticals comprising incorporating the oil, lipid or fatty acid composition according to claim 25 in said feed, foodstuffs, cosmetics or pharmaceuticals.

31. (New) The nucleic acid of claim 11, wherein the nucleic acid sequence has at least 95% identity with the sequence of SEQ ID NO: 16 and codes for a polypeptide having lysophosphatidic acid acyltransferase activity.

32. (New) The nucleic acid of claim 11, wherein the nucleic acid sequence codes for a polypeptide having at least 95% identity with the sequence of SEQ ID NO: 17 and having lysophosphatidic acid acyltransferase activity.